

SUPPLEMENTARY MATERIAL: Electrochemistry of Coenzyme Q-0: A voltammetric and antioxidative study

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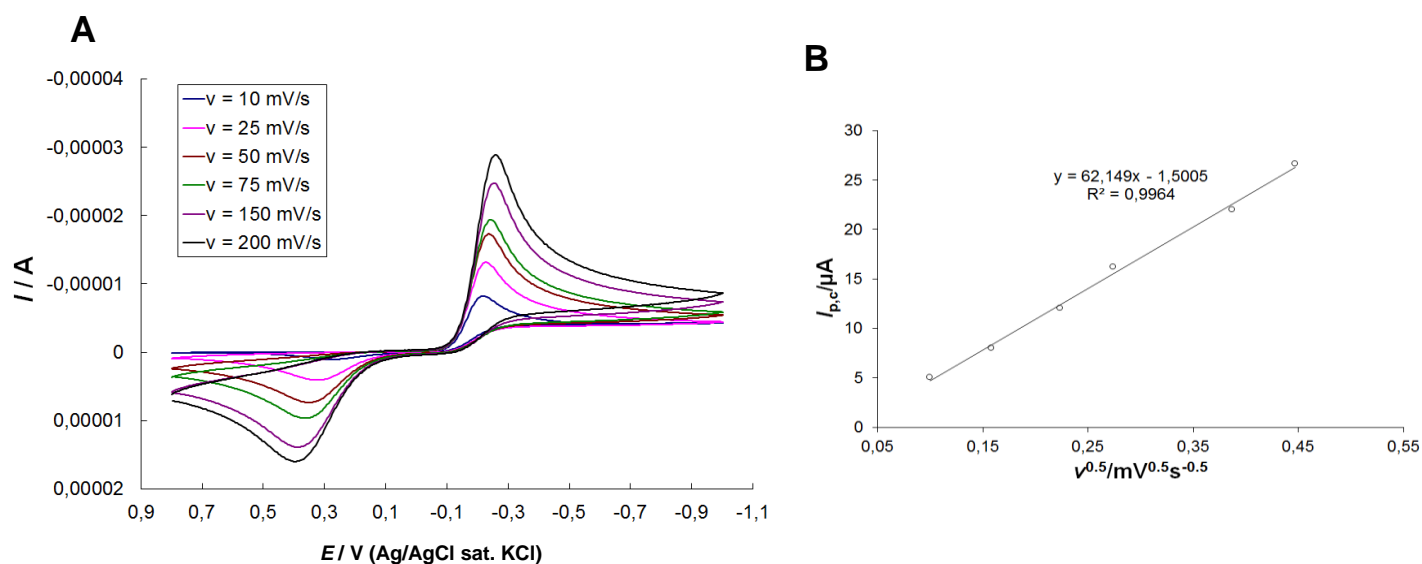
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Abstract: we report in this work on redox features of CoQ-0 in buffered and non-buffered aqueous media was examined. In buffered aqueous media CoQ-0 redox chemistry can be described by a 2-electron–2-proton redox scheme, characteristic for all benzoquinones. In non-buffered media the number of electrons involved in the electrode reaction of CoQ-0 is still 2; however, the number of protons involved varies between 0 and 2. This results in two additional voltammetric signals, attributed to 2-electrons–1H⁺ and 2-electrons–0H⁺ redox processes, in which mono- and di-anionic compounds of CoQ-0 are formed. In addition, CoQ-0 exhibits a complex chemistry in strong alkaline environment. The reaction of CoQ-0 and OH[–] anions generates several hydroxyl derivatives as products. Their structures were identified with HPLC/MS. The prevailing radical reaction mechanism was analyzed by electron paramagnetic resonance spectroscopy. The hydroxyl derivatives of CoQ-0 have a strong antioxidative potential and form stable complexes with Ca²⁺ ions. In summary, our results allow mechanistic insights into the redox properties of CoQ-0 and its hydroxylated derivatives and provide hints on possible applications.

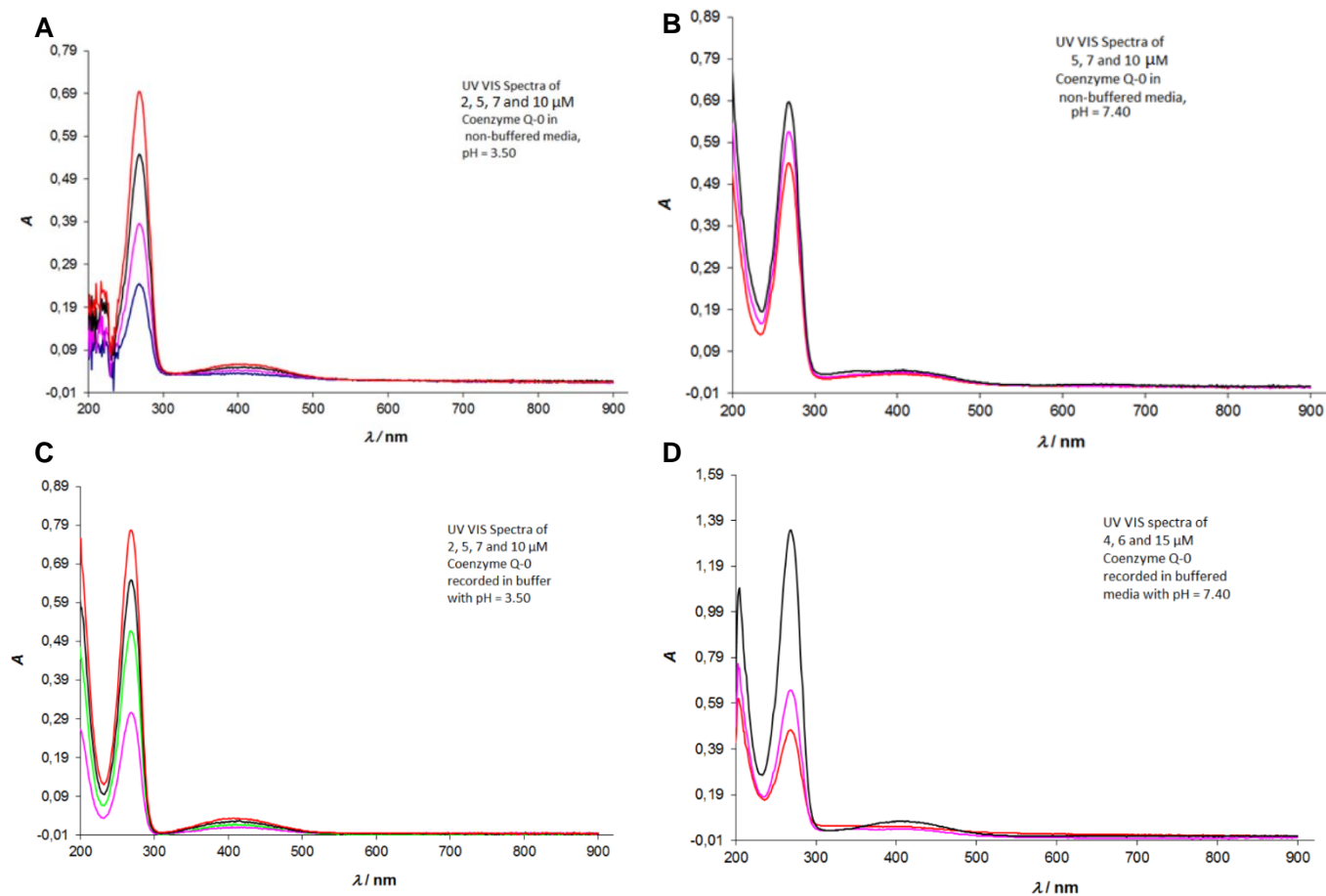


The color of CoQ-0 solution ($c = 1 \text{ mmol/L}$) directly after dissolving it in aqueous solution with pH = 7.00 (left), and after its reaction in 0.1 mol/L NaOH for 60 minutes followed by re-titration with HCl to pH = 7.00 (right).



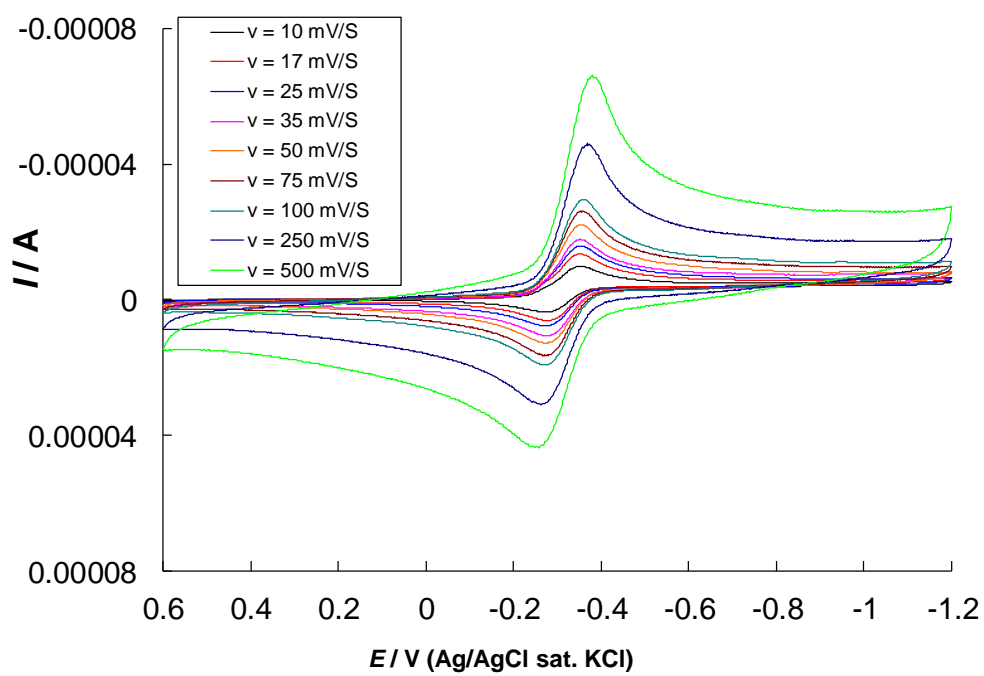
Supplementary figure 1: (A) Buffered water solutions: Cyclic voltammograms of Coenzyme Q-0 ($c = 0.5 \text{ mmol/L}$) recorded in ammonia buffers with $\text{pH} = 7.40$ at several scan rates. **(B)** Dependence of the anodic peak currents of cyclic voltammograms of Coenzyme Q-0 recorded in ammonia buffers ($\text{pH} = 7.40$) on the square root of the applied scan rates.

Figure S1



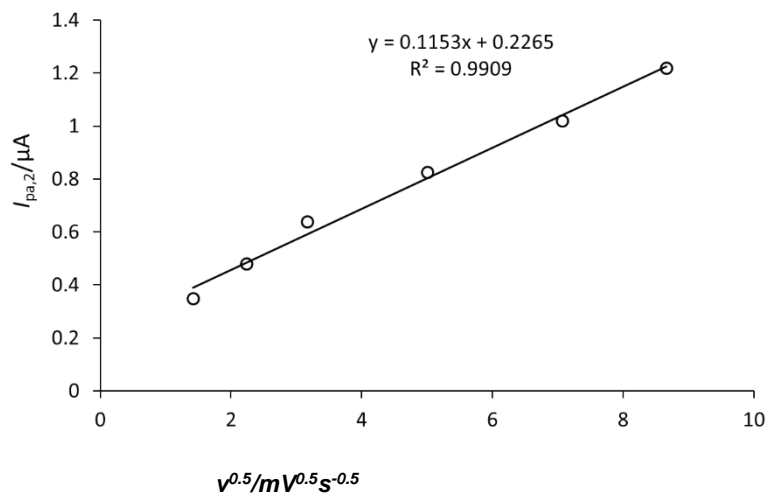
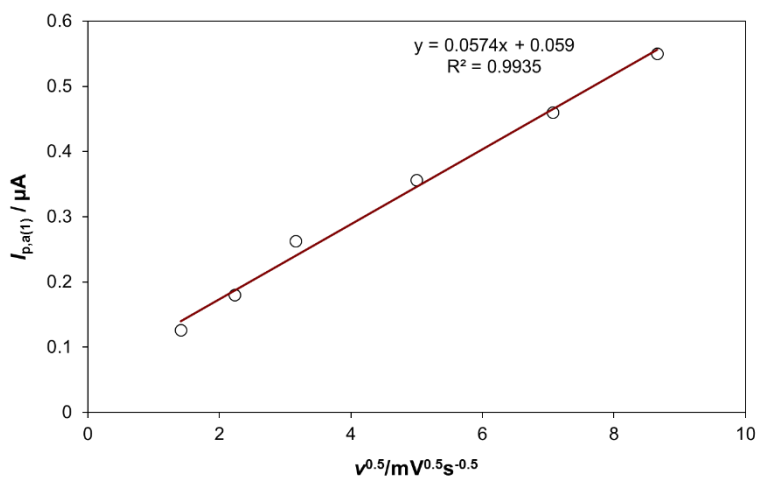
Supplementary figure 2: (A-D) UV-VIS spectra of CoQ-0 recorded in buffered and non-buffered aqueous solution with different pH values.

Figure S2



Supplementary figure 3: Scan rate analysis of 0.5 mmol/L Coenzyme Q-0 recorded in pH of 7.00 in non-buffered solutions

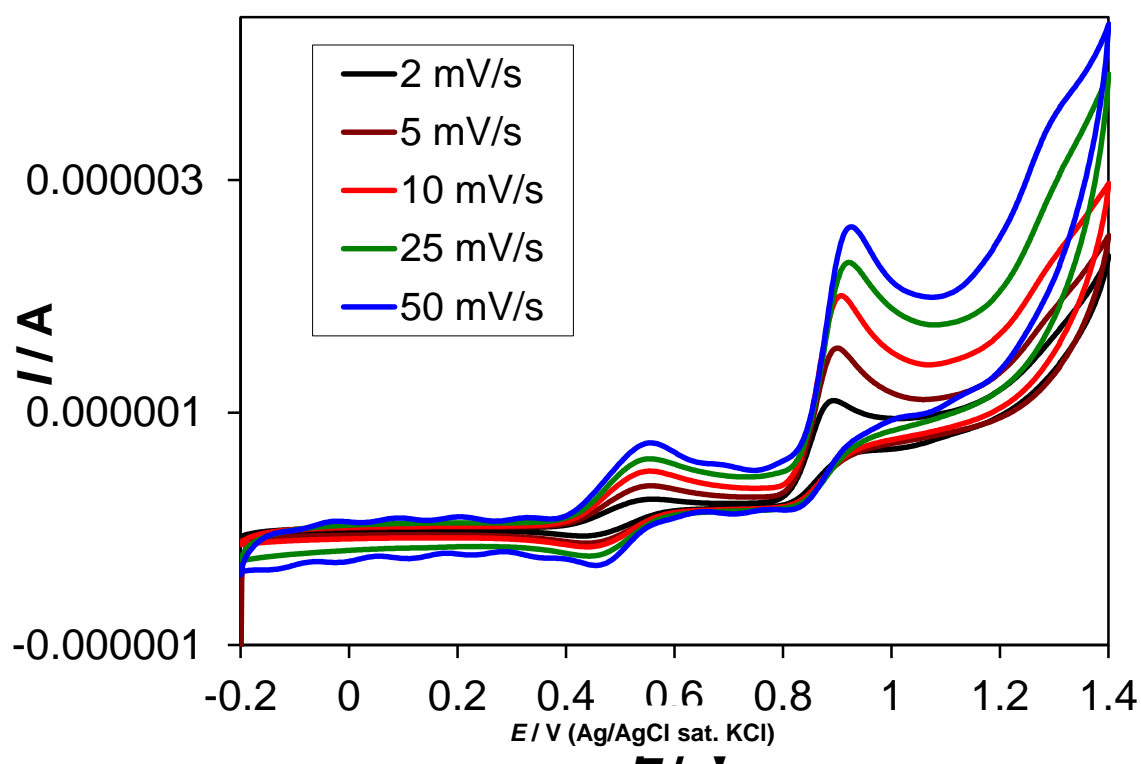
Figure S3





Supplementary figure 4: The color of CoQ-0 solution ($c = 1 \text{ mmol/L}$) directly after dissolving it in aqueous solution with $\text{pH} = 7.00$ (left), and after its reaction in 0.1 mol/L NaOH for 60 minutes followed by re-titration with HCl to $\text{pH} = 7.00$ (right).

Figure S4



Supplementary figure 5: Cyclic voltammograms of 0.5 mmol/L ABTS recorded in pH of 7.00 at different scan rates.

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